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SIPUNCULIDS AND ECHIURIDS OF THE JOHN MURRAY EXPEDITION TO THE RED SEA AND INDIAN OCEAN 1933–34

BY

A. C. STEPHEN, D.Sc.

(Royal Scottish Museum, Edinburgh)

WITH TWO PLATES

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INTRODUCTION.

The collection of Sipunculids and Echiurids brought back by the Expedition was comparatively small, but interesting. Unfortunately the condition of a number of the specimens was very poor and in the case of one station the whole collection had to be left unidentified.

Eight species were recognized and of these two are new to science, namely :

Sipunculids—

1. *Sipunculus billitonensis* Sluiter.
2. *S. robustus* Kef.
3. *Siphonostoma cumanensis* Kef.
4. *Physcosoma nigrescens* Kef.
5. *P. meteori* (Hérubel).
6. *P. sewelli* sp. nov.
7. *P. rüppelii* (Grube).
8. *Phascolion murrayi* sp. nov.

Echiurids—

9. Gen. et sp. ?

The collections came from five separate areas of the Red Sea and Indian Ocean, namely, (*a*) Red Sea and Gulf of Aden ; (*b*) south-eastern coast of Arabia ; (*c*) Gulf of Oman ; (*d*) Zanzibar and neighbourhood ; (*e*) Maldive Islands. The two new species came from deep water, and are closely related to other deep water species already described. It is unfortunate that the full identification of the specimens from the deep water station, No. 124, was not possible, since they probably represented some undescribed Echiurid.

The known range of *Sipunculus robustus* has been very considerably extended, and it is suggested that the previous records of *Sipunculus priapuloides* from the Red Sea and the Loyalty Islands, which have always seemed somewhat out of place, should be referred to *S. robustus*. It has not been possible to examine the two specimens on which the records were based, since they appear to have been lost.

ACKNOWLEDGMENTS.

I am indebted to Mr. C. C. A. Monro, of the British Museum, for the privilege of examining and reporting on the collection.

To Mr. R. J. Fant, Zoology Department, the University, Edinburgh, I am indebted for the photographs to illustrate this paper.

SIPUNCULOIDEA.

1. *Sipunculus billitonensis* Sluiter.

Sipunculus billitonensis Sluiter, 1886, p. 487.
Sipunculus billitonensis Sluiter, 1891, p. 123.
Sipunculus billitonensis Sluiter, 1902, p. 4.
Sipunculus billitonensis Shipley, 1899, p. 157.
Sipunculus billitonensis Shipley, 1903, p. 135.
Sipunculus billitonensis Lanchester, 1905*b*, p. 30.

LOCALITY :

Maldive Islands, St. 147, 4° 53′ 12″ N., 72° 54′ 30″ E., 2.iv.34, 27 m. grab, sft. cm. m.

Two small partially contracted specimens, 70 mm. and 58 mm. respectively, were taken. They were light yellow-brown in colour and the anus was not very prominent, as is often the case. In this latter respect they differed from those described by Shipley (1899, p. 157, and fig. 7) from the Loyalty Islands, but agreed with the specimens reported on by him (Shipley, 1903, p. 135) from the Laccadive Islands. They agreed well with Sluiter's description and call for no comment.

The species is recorded from the Maldive Islands for the first time, but is already known from the neighbouring Laccadive Islands (Shipley, 1903). Elsewhere it has been recorded from the Loyalty Islands (Shipley, 1899), the Dutch East Indies (Sluiter, 1902), and from Pemba Island, near Zanzibar (Lanchester, 1905).

2. *Sipunculus robustus* Kef.

Sipunculus robustus Keferstein, 1865, p. 421.
Sipunculus robustus Kef., Baird, 1868, p. 80.
Sipunculus robustus Kef., Selenka, 1889, p. 221.
Sipunculus robustus Kef., Selenka and de Man, 1883–4, p. 97.
Sipunculus robustus Kef., Sluiter, 1886, p. 482.
Sipunculus robustus Kef., Sluiter, 1891, p. 122.
Sipunculus robustus Kef., Sluiter, 1902, p. 4.
Sipunculus robustus Kef., Fischer, 1922, p. 7.
Sipunculus robustus Kef., Augener, 1903, p. 313.
Sipunculus robustus Kef., Lanchester, 1905*a*, p. 27.
Sipunculus robustus Kef., Ten Broeke, 1925, p. 82.
Sipunculus robustus Kef., Sato, 1935, p. 301.

Localities :

Maldive Islands :

St. 142, 5° 23′ 12″ N., 73° 37′ 06″ E., 30.iii.34, 37 m. grab, cm. m.
St. 147, 4° 53′ 12″ N., 72° 54′ 30″ E., 2.iv.34, 27 m. grab, sft. cm. m.
St. 160, 4° 52′ 30″ N., 72° 51′ 36″ E., 7.iv.34, 37 m. grab, cm. m.
St. 161, 5° 04′ 48″ N., 72° 50′ 30″ E., 8.iv. 34, 46 m. grab, c. s.
St. 163, 8° 15′ 18″ N., 73° 01′ 36″ E., 11.iv.34, 274 m. grab, gn. s.

Gulf of Oman :

St. 70, 25° 34′ 12″ N., 57° 23′ 36″ E., 25.xi.34, 199 m., sft. gn. m.

The eight specimens from St. 70 differed very distinctly from the rest. They were, unfortunately, somewhat macerated with the cuticle very largely separated from the rest of the body. They were blue-grey in colour, highly iridescent and, to a slight degree, translucent. The outstanding character was that of a zone of finger-like processes in the middle region of the body (Pl. I, fig. 1). These processes were of the same colour as the body and had the same iridescent translucent appearance. A similar appearance has already been seen in the animals which Keferstein described under the name of *S. tessellatus*, but which Baird (1868 p. 78) considered should be regarded as a variety of *S. nudus*. In *S. tessellatus*, however, these processes were situated on the lower half of the introvert. In other respects these animals agreed with *S. robustus*, and it seems best to consider them as only a variety of that species.

One animal was dissected. The longitudinal muscles were divided into 27 bands. The four retractors arose at the same level and only a short way behind the anus. The ventral retractors arose from the third and fourth longitudinal muscle-bands and the dorsal retractors from the ninth and tenth. The largest specimen, which was fully expanded, measured about 125 mm. overall. The remainder, mostly contracted, were between 60 and 100 mm. overall.

The specimens from the Maldive Islands were, on the whole, much smaller and in good preservation. Three specimens were taken at St. 160. Two were comparatively large, while the third was small. The latter showed interesting features and further reference will be made to it later. The two large specimens were contracted and measured 69 and 60 mm. respectively. In the largest animal there were 28 longitudinal muscle-bands anteriorly and 26 posteriorly. The ventral retractors arose from the third, fourth and fifth muscle-bands and the dorsal from the ninth to eleventh muscle-bands. The posterior extremity of the body was strongly ribbed, but the ribbing did not extend quite to the posterior end, which had a somewhat bulbous appearance. The smaller specimen was also strongly ribbed. The posterior end was also strongly ribbed, was somewhat bulbous in appearance and had a distinct collar (Pl. I, fig. 2). The ribbing was strongly shown on the collar, but posteriorly to it the body was practically smooth, shining and iridescent, with only one or two of the ribs extending over it.

The specimen from St. 142 was partially contracted and about 32 mm. in length. Anteriorly there were 27 longitudinal muscle-bands and posteriorly 26. The appearance of the posterior end was the same as in the previously described animal, namely, the longitudinal muscle-bands did not continue right to the posterior end.

The specimen from St. 147 was partially contracted and was about 24 mm. in length. In it the ribbing continued right to the end of the body. The animal from St. 163 was

much macerated, expanded and 24 mm. in length. The posterior end was iridescent, bulbous and similar in appearance to the small specimen from St. 162 about to be described.

This specimen (Pl. II, fig. 3) was very interesting. In colour it was red-brown and heavily ribbed in the middle portion of the body. The posterior end was bulbous and transparent, and the ribbing was continued indistinctly over it. There were 24 longitudinal muscle-bands.

The reason for this detailed description of the appearance of the posterior end of the body is that there seems to have been a certain amount of confusion regarding these small forms. In *S. robustus* the number of longitudinal muscle-bands varies from 24 to 31. In the small animals taken by the Murray Expedition there were only 24 bands and the posterior end was bulbous and often smooth. These characters also agree with those of *Sipunculus priapuloides* described by Koren and Danielssen (1877, p. 126) from the Norwegian coast. This latter species has been considered as a synonym of *Sipunculus norvegicus* Kor. et Dan. by Théel (1906, p. 56). I have compared these small specimens with specimens of *S. norvegicus* in my possession and the appearance of the posterior end is quite different in the two sets of animals. I have therefore considered these small *Sipunculus* from the John Murray Expedition as young *S. robustus*, and following the same line of argument consider that the records of *S. priapuloides* from Lifu in the Loyalty Islands given by Shipley (1899, p. 158) and from the Red Sea by Robinson (1927, p. 359) should probably be referred to *S. robustus*. As already stated, it has not been possible to examine the specimens on which the two records in question were made, as the specimens appear to have been lost.

S. robustus has a wide distribution in tropical seas. It has been taken at numerous places in the Pacific and East Indies; also from the West Indies (Ten Broeke, 1925, p. 82).

3. *Siphonostoma cumanensis* Kef.

Locality:

Gulf of Oman, St. 72, 25° 38′ 18″ N., 56° 26′ 36″ E., 26.xi.33, 73 m., Agassiz trawl, c. s. sh.

One specimen, about 30 mm. in length, was taken. It was in a very macerated condition and all internal features had been destroyed. From external characters it would appear to have belonged to this species, but it is not possible to refer it to any of the known varieties.

4. *Physcosoma nigrescens* Kef.

Localities:

Red Sea, St. M.B.*b*, 13° 39′ 30″ N., 42° 43′ 00″ E., 17.ix.33, 29 m., s. sh. cr.

Red Sea, St. M.B.*d*, 13° 39′ 30″ N., 42° 43′ 00″ E., 17.ix.33, 26 m., s. sh. cr.

South-eastern coast of Arabia, St. 45, 18° 03′ 30″ N., 57° 02′ 30″ E., 29.x.33, 38 m., Lith.

The specimens taken were all small. At St. *b* the largest, which was fully expanded, measured only 18 mm. in length. The others were much smaller. The small animals were all yellowish-white in colour, but the larger one, already mentioned, had a few of the usual red-brown papillae scattered over the body.

This species is widely distributed in tropical and subtropical waters of the Atlantic and Pacific.

5. *Physcosoma meteori* (Hérubel).

Phymosoma meteori Hérubel, 1904, p. 477.

Locality :

South-eastern coast of Arabia, St. 45, 18° 03′ 30″ N., 57° 02′ 30″ E., 29.x.33, 38 m., Lith.

This species reaches a length of 6–7 cm., but the four specimens taken by the Expedition were all small, the largest being only 12 mm. in length. They agreed with Hérubel's description and call for no comment. Notes of the habitat made at the time of collecting indicate that the animals were living in the tissues of sponges, but in one case the specimen was found in the residue at the foot of a jar containing calcareous sponges. The present record considerably increases the known range of the species, the previous records of Hérubel being all from the Red Sea, namely : Gulf of Tadjourah, Meteor Reef, dredging in 18–20 m. ; Pingouin Reef, dredging in sand at the base of the reef in 18–20 m. ; Bay of Djibouti, in tubes of *Hircinia* ; Messageries Reef, north-west of the plateau of Héron in the furrows of sand at the bases of sponges ; Ambouli.

6. *Physcosoma sewelli* sp. nov.

Localities :

Entrance to the Gulf of Oman, St. 59, 22° 22′ 48″ N., 60° 6′ 24″ E., 6.xi.33, 1948 m., sft. gn. m.

Off the Maldive Islands, St. 162, 8° 08′ 30″ N., 72° 58′ E., 10.vi. 34, 2051 m., gy. m.

One specimen was taken at each station and in both cases there had been a certain amount of internal maceration, so that, in certain respects, the description is somewhat incomplete.

Holotype.

Specimen contracted, preserved in a slightly twisted position and measuring approximately 70 mm. in length. The colour of the body was dark grey-brown and the introvert black. The shape was more or less cylindrical and about 8 mm. in diameter, except for a globular swelling at the base of the introvert. The body was strongly ridged circularly, and on parts, more especially on the introvert, the cuticle gave it a corky appearance which obscured the papillae. Papillae were scattered thickly over the surface of the body. These were more or less circular in shape and varied in size from about ·06 mm. to ·25 mm. in diameter. Over most of the body they seemed almost flat or only very slightly raised, but at the posterior end they were more or less hemispherical. No hooks were present on the introvert.

The posterior half of the digestive tract was macerated so that no count of turns of the gut could be made. There was a strong spindle muscle which was attached to the body-wall in front of the anus and which extended as far back as the gut was preserved. It was probably attached posteriorly. Two reddish nephridia were present, which were free for their whole length.

The grouping of the longitudinal muscles into bands was not at all clearly shown and

could be distinguished for only a short distance in the anterior portion of the body. Circular rows of masses of red cells with a wavy outline occurred in the anterior portion of the body. There were only two very stout retractor muscles, which were attached about the middle of the body. They were about 4 mm. in breadth, and were joined to form a single stout column after about half their length. The holotype was taken at St. 59 and is deposited in the British Museum.

The animal from St. 162 was much smaller. It was contracted and measured only 30 mm. overall. The body was broadest at the posterior end and tapered to the introvert. The colour was grey-brown and, as in the holotype, the cuticle formed a corky layer which completely obscured the papillae. The longitudinal muscles were clearly grouped into bands only in the anterior middle quarter of the body, but anastomosed to such a degree that it was impossible to make a count of them. Indeed, this portion of the body-wall had the appearance of a sheet of muscle with numerous slits in it. Posteriorly and anteriorly of this area the longitudinal muscles formed a continuous sheet.

The two strong retractors arose from the posterior end of the middle third of the body. They had broad roots and ran together after a distance of only about a single mm. In this specimen, also, the lower half of the gut was macerated, so that neither the number of coils nor the possible posterior attachment of the spindle muscle could be made out. The wavy masses of red cells seen in the holotype were not visible in this animal. As in the holotype there were no hooks on the introvert.

In spite of the slight differences in the two specimens and although taken so far apart from each other there is no doubt that they belong to the same species. Further, they both came from similar depths and from the same type of sea bottom.

The members of the genus *Physcosoma* are, as a rule, inhabitants of shallow water, but one species, *P. abyssorum* (Southern, 1913, p. 12), has been described from deep water off the coast of Ireland in 802–932 m. Later it was taken off Sierra Leone (Fischer, 1917, p. 15) in 4990 m. To it the new species shows greater affinities than to other members of the genus. Like *P. abyssorum* it has only two retractors, is transversely wrinkled, has papillae scattered over the body and has the longitudinal muscles clearly grouped into definite bands in only a limited area of the body. It differs chiefly from *P. abyssorum* in having no hooks on the introvert and in the papillae. In *P. sewelli* these are numerous and not of distinctly different dimensions on the anterior and posterior portions of the body, while in *P. abyssorum* they are large, less numerous and largest posteriorly. In this latter species, also, the retractors are free for most of their length.

The genus is usually associated with coral, and Southern's specimen was taken in association with the coral *Lophohelia prolifera*. This association with coral may also occur in the case of this new species, since at St. 59 the corals *Deltocyathus murrayi* (Gardiner and Waugh, 1938, p. 197) and *Bathyactis ? symmetrica* (Gardiner, 1939, p. 231) were recorded. There was no record of corals from St. 162.

7. *Physcosoma rüppelii* (Grube).

Phascolosoma Rüppelii Grube, 1868, p. 643.
Physcosoma rüppelii Grube, Selenka, 1883–84, p. 82.
Physcosoma rüppelii Grube, Shipley, 1903, p. 135.

Localities :

Red Sea, St. M.B.I.(*b*), 13° 39′ 30″ N., 57° 02′ 30″ E., 17.ix.33, 29 m., s. sh. cr.

Red Sea, St. M.B.I.(*c*), 13° 39′ 30″ N., 57° 02′ 30″ E., 17.ix. 33, 26 m., cr. r.

South-east coast of Arabia, St. 45, 18° 03′ 30″ N., 57° 02′ 30″ E., 29.x.33, 38 m., Lithothamnion and Hydrocorallines.

Four specimens were secured at St. *b* and one at each of the other two. All agreed well with the original description. The hook is very small; that figured measured only ·032 mm. in height and ·028 mm. in breadth. It is very coarse in appearance (Pl. II, fig. 4). In the notes on the collection the animals from St. 45 were described as having been found at the bottom of a jar containing dense, much-branched *Alcyonaceae* covered with other animals.

The species is already recorded from the Red Sea (Grube) and from the Maldive Islands (Shipley).

8. *Phascolion murrayi* sp. nov.

Locality :

Gulf of Aden, St. 33, 13° 41′ N., 48° 17′ E., 15.x.33, 1295 m., Agassiz trawl, gr. m.

Holotype.

The single specimen secured was yellow-grey in colour and had been preserved contracted and in a twisted position. The length was between 25 and 30 mm. The whole body and introvert were thickly covered with papillae, which were small on the introvert and on the anterior portion of the body, but large posteriorly.

On the introvert the cuticle was thrown into slight dark ridges, and scattered amongst these were small flat dark papillae of irregular shape about ·04 mm. in diameter. On the anterior portion of the body the papillae were closely crowded, oval in shape and of the same colour as the skin. These varied greatly in shape, the largest measuring about ·2 mm. by ·1 mm. The posterior portion of the body was covered with attaching papillae, except for a small area at the extreme tip. These papillae (Pl. II, fig. 5) had the appearance of short stout truncated rods, obliquely truncated at the top and bearing a chitinous rim, which was not toothed but of uniform thickness all round. In most, this rim was shaped like a horse-shoe but in others it formed a complete ring. These papillae varied greatly in size. The larger ones were about ·32 mm. by ·24 mm.

There were no hooks on the introvert.

There was only a single retractor which was attached to the posterior end of the body. Owing to the specimen being torn it was not possible to count the number of coils in the gut.

Holotype deposited in the British Museum.

Echiuroidea.

9. *Genus et Species ?.*

Locality :

Off Zanzibar, St. 124, 5° 39′ N., 39° 39′ 24″ E., 23.i.34, 914 m., gy. gr. m. s.

Fifteen specimens, ranging in length from 85 mm. to 160 mm., were taken. They were in most cases quite flat, as if they had been put through rollers, being mostly only

about 1 or 2 mm. in thickness. One or two were slightly thicker and contained a little mud.

Externally they were almost smooth, but in one or two cases it was possible to make out the remains of a few transverse rows of large papillae at the posterior end, such as are found in *Echiurus*. In most of the specimens all internal structure had almost completely disappeared and no characters could be made out. In one animal, two golden setae were found in the small amount of mud and indistinguishable matter inside. These setae were similar to the ventral paired setae found in *Echiurus* and *Thalassema*, and occurred in the same position, as if they had been pushed into the body. They were sickle-shaped and curved in a slightly skew position.

It is possible that these specimens may represent some undescribed species and it is unfortunate that the material did not allow of a fuller description.

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DESCRIPTION OF PLATE I.

FIG. 1.—*Sipunculus robustus* Kef. Stn. 70. × 1½ nat. size.

FIG. 2.—*Sipunculus robustus* Kef. Stn. 160. Posterior portion of body. × 3 nat. size.

FIG. 1.

FIG. 2.

[*Adlard & Son, Ltd., Impr.*

DESCRIPTION OF PLATE II.

FIG. 3.—*Sipunculus robustus* Kef. Stn. 160. × 3 nat. size.

FIG. 4.—*Physcosoma rüppelii* (Grube). Stn. M.B.*c*. Drawing of hook from introvert. × 1000.

FIG. 5.—*Phascolion murrayi* sp. nov. Stn. 33. Papillae at posterior end of body. × 15.

FIG. 3.

FIG. 4.

FIG. 5.

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